



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification: G11C 7/16, G07F 17/30	A1	(11) International Publication Number: WO 00/30117
		(43) International Publication Date: 25 May 2000 (25.05.2000)

(21) International Application Number: PCT/US99/20789

(22) International Filing Date: 14 September 1999 (14.09.1999)

(30) Priority Data:
09/190,259 13 November 1998 (13.11.1998) US(60) Parent Application or Grant
SONY ELECTRONICS INC. [/]; O. GIOSCIA, Richard [/]; O
. SONODA, Yumi [/]; O. ZOELS, Jan-Christoph [/];
O. KANANEN, Ronald, P. ; O.

Published

(54) Title: METHOD AND APPARATUS FOR COMMERCIAL DISTRIBUTION AND PERFORMANCE OF RECORDED MUSIC
(54) Titre: PROCEDE ET APPAREIL DE DISTRIBUTION COMMERCIALE ET DE REPRODUCTION DE MUSIQUE
ENREGISTREE

(57) Abstract

A network of kiosks (101) each contain a database (108) of digital music recordings. Using a display device (105) and a user input device (106) on each kiosk (101), a purchaser can see a listing of the music recordings available in the database (108) and select a recording to be downloaded. The selected recording is transmitted, preferably wirelessly, to a personal music device (103) worn on the wrist or clipped to the clothing of the purchaser. The purchaser pays for the recording. The personal music device (103) can then immediately retrieve and play the recording, preferably through headphones connected (112) to the personal music device (103).

(57) Abrégé

L'invention concerne un réseau de terminaux interactifs (101), chaque terminal contenant une base de données (108) d'enregistrements numériques de musique. Grâce à un afficheur (105) et à un périphérique d'entrée utilisateur (106) placés sur chaque terminal (101), un acheteur peut visualiser une liste d'enregistrements musicaux disponibles dans la base de données (108) et sélectionner un enregistrement à télécharger. L'enregistrement sélectionné est transmis, de préférence par radiofréquence, à un dispositif de musique personnel (103) porté sur la taille ou accroché à un vêtement de l'acheteur. Ce dernier paie l'enregistrement une fois terminée l'opération. Le dispositif de musique personnel (103) peut récupérer immédiatement l'enregistrement et le reproduire, de préférence, par le biais d'écouteurs connectés (112) au dispositif de musique personnel (103).

PCT

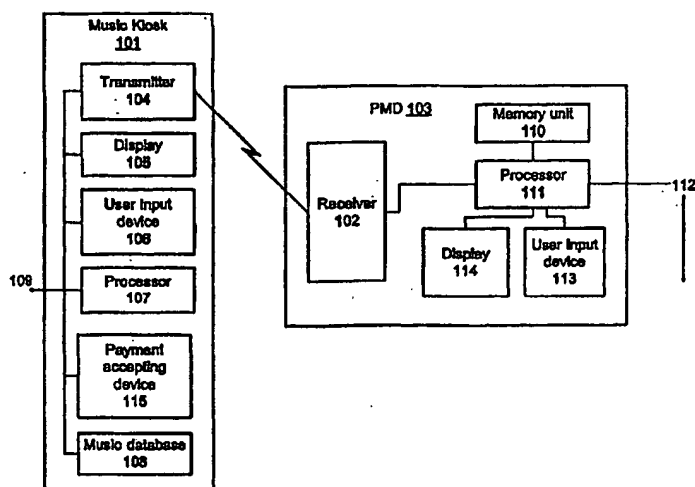
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G11C 7/16, G07F 17/30	A1	(11) International Publication Number: WO 00/30117 (43) International Publication Date: 25 May 2000 (25.05.00)
(21) International Application Number: PCT/US99/20789 (22) International Filing Date: 14 September 1999 (14.09.99) (30) Priority Data: 09/190,259 13 November 1998 (13.11.98) US (71) Applicant: SONY ELECTRONICS INC. [US/US]; 1 Sony Drive, Park Ridge, NJ 07656 (US). (72) Inventors: GIOSCIA, Richard; 38 Winding Trail, Mahwah, NJ 07430 (US). SONODA, Yumi; 1022 South Springer Road, Los Altos, CA 94024 (US). ZOELS, Jan-Christoph; 33 Flatbush Avenue, Brooklyn, NY 11217 (US). (74) Agent: KANANEN, Ronald, P.; Rader, Fishman & Grauer PLLC, Suite 501, 1233 20th Street, NW, Washington, DC 20036 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: **METHOD AND APPARATUS FOR COMMERCIAL DISTRIBUTION AND PERFORMANCE OF RECORDED MUSIC**



(57) Abstract

A network of kiosks (101) each contain a database (108) of digital music recordings. Using a display device (105) and a user input device (106) on each kiosk (101), a purchaser can see a listing of the music recordings available in the database (108) and select a recording to be downloaded. The selected recording is transmitted, preferably wirelessly, to a personal music device (103) worn on the wrist or clipped to the clothing of the purchaser. The purchaser pays for the recording. The personal music device (103) can then immediately retrieve and play the recording, preferably through headphones connected (112) to the personal music device (103).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

5

TITLE OF THE INVENTION

10

Method and Apparatus for Commercial Distribution and
5 Performance of Recorded Music

FIELD OF THE INVENTION

15

20

The present invention relates to the field of
commercial music sales and distribution. The present
10 invention also relates to personal music devices for
storing and playing recorded music. More specifically,
the present invention relates to a system of publicly
available terminals or kiosks that can download digital
music recordings into personal music devices for storage
15 and performance.

25

BACKGROUND OF THE INVENTION

30

Traditionally, music is commercially distributed
through a relatively narrow trade channel. Once the
20 music is recorded, it is distributed to radio stations.
The radio stations then broadcast the music publicly. In
this way, the radio station's broadcast has a content
that will draw listeners and, therefore, advertising
revenue.

35

25 Additionally, the music broadcast by the radio
station becomes known to the public. Those who
particularly enjoy the music will then seek to purchase a
recording of it.

40

Recordings of musical works are typically sold in
30 retail stores or, alternatively, through catalogs and
mail orders. The music is recorded on a physical data
storage device such as a digital compact disc (CD) or a
cassette tape. The disc or tape with the recordings
desired by a purchaser is identified or selected at a
45 retail outlet and purchased.

45

50

35 After an interested listener has purchased the
recording, that listener can hear a performance of the

55

music anytime it is desired by playing the disc or tape on a disc or tape player. Disc players are now frequently provided in automobiles and computers.

Additionally, disc players may be part of a large home stereo system or a portable personal stereo device.

Historically, music stores and mail order services were the sole methods for the commercial distribution and sale of musical recordings. However, with the advent of the compact disc and digital recording, the data

composing a musical recording is no different from any other digital data and can be copied and transmitted electronically, for example, over phone lines and computer networks such as the internet.

With this advance, a purchaser can preview or listen to musical recordings with a computer. It is even possible to download music from the internet which is then performed as a live bit-stream or stored and played by the listener's computer on command. If the listener has, for example, a writeable CD drive connected to his or her computer, the downloaded music may be optically recorded on a blank compact disc that can then be used as any other compact disc purchased from a retail outlet.

While music can be distributed and even sold over a computer network such as the internet, such a system still requires that the purchaser use his or her computer to connect to the network to access and download musical recordings. This necessarily limits the distribution of music electronically. There are many instances in which a listener, who is away from his or her computer and internet connection, may wish to obtain a musical recording for immediate performance.

Consequently, there is a need in the art for a method and apparatus that takes advantage of the ability to transmit and copy music digitally to make music more widely and easily distributed without requiring a user to visit a music store or connect via computer from home or office to the internet or other computer network.

SUMMARY OF THE INVENTION

Consequently, it is an object of the present invention to meet the above-described needs and others.

Specifically, it is an object of the present invention to provide a method and system in which music recordings can be downloaded from publicly available terminals into personal music devices for immediate storage and performance.

Additional objects, advantages and novel features of the invention will be set forth in the description which follows or may be learned by those skilled in the art through reading these materials or practicing the invention. The objects and advantages of the invention may be achieved through the means recited in the attached claims.

To achieve the stated and other objects, the present invention may be embodied and described as a method of commercially distributing musical recordings by downloading a digital recording of music from a kiosk to a self-contained personal music device which stores the recording in an electronic memory and can play the music recording. Preferably, the downloading is accomplished wirelessly.

The method of the present invention may also include the steps of reviewing a listing of the music recordings which are available for download on a display of the kiosk; and selecting a music recording for download from the listing. The selection is performed with a user input device on the kiosk. The downloading of the music recording is initiated in response to the selecting of the recording by the purchaser.

Additionally, the method of the present invention may include receiving payment for the downloading of the music recording. Once the download to the personal music device is completed, the method may include retrieving the music recording from the electronic memory; and

5 transducing the music recording into audible sound with
the personal music device.

10 For carrying out the forgoing method, the present
invention also encompasses a self-contained personal
5 music device having a receiver for receiving a download
of a digital music recording; an electronic memory unit
for storing the digital music recording; and a processor
15 for accessing the recording in the memory unit and
outputting an audio signal which can be transduced into
10 audible sound.

20 Preferably, the receiver is a wireless receiver for
receiving the download of a digital music recording
wirelessly. The personal music device of the present
invention also preferably includes a port for receiving a
15 jack of a pair of headphones, the audio signal being
output through the port.

25 The personal music device is preferably worn by the
user. For example, the personal music device of the
present invention may include a wristband and may be
20 sized to be worn on a human wrist. Alternatively, the
personal music device of the present invention may
30 include a clip for clipping the device to a user's
clothing.

35 The personal music device of the present invention
25 may also include a user input device with which a user
can control the processor to selectively access or
process music recordings in the memory unit. To monitor
the processor and the instructions in put with the user
40 input device, the personal music device of the present
30 invention may include a display device.

45 The present invention also encompasses a kiosk for
dispensing digital music recordings to personal music
devices. The kiosk may include a music database
containing at least one digital music recording; and a
35 transmitter for transmitting a digital music recording
from the database. Preferably, the transmitter is a

5 wireless transmitter for wirelessly transmitting the music recording to the personal music device.

10 The kiosk of the present invention also preferably includes a payment receiving device for receiving payment
5 for transmitting the digital music recording. A display device of the kiosk is driven by a processor. The processor may provide a listing of the music recordings in the database on the display device. A user input
15 device connected to the processor allows a user to control the displayed listing of music recordings and to select a music recording from the listing to be transmitted by the transmitter.

20 Preferably the kiosk of the present invention also includes an external connection through which music
15 recordings can be remotely added to or deleted from the database. Moreover, the kiosk of the present invention is preferably one of a network of kiosks which are provided in publicly accessible locations where people frequently listen to music through personal music
25 devices.

30 BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the present invention and are a part of the specification. Together
35 25 with the following description, the drawings demonstrate and explain the principles of the present invention.

Fig. 1 is block diagram of a music kiosk and personal music device ("PMD") of the present invention.

40 Fig. 2 is a diagram of a first embodiment of the personal music device according to the present invention.

Fig. 3 is a diagram of a second embodiment of the personal music device according to the present invention.

45 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

35 The present invention may be embodied in a system of publicly available terminals or kiosks at which a user
50 may purchase and download a digital musical recording.

5 The recording is preferably stored in a compact, personal
music playing device that is portable and can be used to
perform the downloaded music immediately, preferably with
10 the use of headphones.

5 Such kiosks can be fully automated like a
conventional vending machine and can, therefore, be
widely placed in those areas where people frequently
listen to music, particularly with personal stereo
15 systems. For this discussion, personal stereo systems
are, for example, compact tape or disc players that
include headphones through which the user listens to the
20 music.

For example, a music kiosk according to the present
invention could be provided in a fitness or health club
15 where patrons typically listen to music with personal
stereo systems while exercising. Patrons of such a club
may frequently wish to obtain a new recording to listen
to during a workout. Additionally, a music kiosk
according to the present invention could be provided at
20 recreational facilities such as ski resorts, beaches,
spas, public parks, amusement parks, etc. where patrons
may be listening to music with personal stereo systems.

A music kiosk according to the present invention may
also be placed in transportation systems such as airports
35 and train or bus terminals. Music kiosks according to
the present invention may even be placed on vehicles such
as airplanes, trains, ships, etc. In short, anywhere
people might want to listen to music through a personal
40 stereo system.

30 A music kiosk or terminal 101 of the present
invention is illustrated in Fig. 1. The kiosk 101
includes, for example, a processor 107 that drives a
display device 105. The processor is controlled with a
45 user input device 106. The display 105 and input device
106 are used by someone wishing to identify a musical
selection that he or she wishes to purchase. By
50 operating the input device 106, the user may scroll

5 through a listing of the music available through the
kiosk 101. This listing is displayed on the display 105.
The user also uses the input device 106 to select or
10 indicate the music he or she wishes to purchase.

5 The user input device 106 may be any of a number of
equivalent devices. For example, the user input device
106 may be an alphanumeric keyboard, a trackball with a
15 selection button, a joystick with a selection button,
etc. Any device which can be used by the user to
10 navigate through a listing of musical works on the
display 105 and indicate a selection from among the
listings would be considered an equivalent user input
20 device for purposes of the present invention.

Similarly, the display device 105 may be any device
15 on which a listing of the music available can be
displayed. Examples include a liquid crystal display
25 (LCD), an electro-luminescent or FED display or a cathode
ray tube (CRT). The listing of the music may be printed
or displayed text, pictures or icons representing the
20 music available, or a combination of the two.

Once music has been selected for download, the
purchaser may then insert cash or a credit card to pay
for the music. The payment accepting device 115 can be
made to accept cash, credit cards or both.

35 Alternatively, the user may input a subscription or
25 billing identification and be billed later for the music
being downloaded.

When a selection has been made and paid for, the
40 selected music is downloaded from the kiosk into a
30 personal music device of the present invention. The
personal music device ("PMD") of the present invention is
preferably very compact so as to be easy to carry and use
45 in virtually any location.

As shown in Fig. 1, the PMD 103 of the present
35 invention includes a receiver 102 for receiving the
download of a musical recording from the kiosk. The
50 kiosk will transmit the music being downloaded

5 electronically with a transmitter 104. Once the music is received, the PDM stores the recording in a digital memory unit 110.

10 The transmitter 104 of the kiosk 101 and the
5 receiver 102 of the PMD may be any of a number of equivalent electronic communication devices under the principles of the present invention. For example, the receiver 102 may include a terminal or port to which a
15 wire from the transmitter 104 of the kiosk 101 may be connected. The music may then be downloaded from the kiosk 101 to the PMD 103 over the wireline connection.

20 Alternatively and preferably, the connection between the transmitter 104 and the receiver 102 is wireless. For example, the transmitter 104 may be a light source, and receiver 102 may be a light detector, e.g. infrared.
25 Alternatively, the transmitter 104 may be an acoustic signaler, and receiver 102 may be an acoustic receiver, e.g. ultrasonic. Finally, transmitter 104 and receiver 102 may both be a radio antenna for wireless transmitting
30 musical recordings with a radio frequency signal.

35 A processor 111 of the PMD 101, which is controlled by a user input device 113, accesses the music in memory 110 to perform the recording. Preferably, the user input device 113 is a keypad with buttons for retrieving and
40 playing music, moving fast forward or in reverse through a musical piece, skipping between musical tracks, adjusting volume, etc. In addition to a keypad, any other user input device capable of giving similar
45 commands to the processor 111 would be equivalent in the present invention.

50 A display 114 may also be provided on the PMD 103. The display device 114 would preferably be an LCD on which may be displayed information such as a designation of the musical recording being performed or the action
55 being taken, e.g. fast forward, track skipping, etc.

While the PMD 103 might include a speaker for performance of the musical recordings, due to the size

constraints of the PMD, a speaker producing music of sufficient quality and volume would be difficult to provide. Therefore, the PMD 103 preferably includes a jack or terminal 112 to which headphones (not shown) may be connected. With headphones connected to the processor 111, the music recordings in memory unit 110 can be transduced into high quality, audible music.

As shown in Figs. 2 and 3, the PMD of the present invention may be embodied in a number of different devices. For example, as shown in Fig. 2, the PMD of the present invention includes a clip 201 with which it can be clipped to a belt or other clothing of the wearer. As will be appreciated by those skilled in the art, many equivalent clip designs and configurations could equivalently be used to accomplish the present invention.

A jack 202 is also provided to which headphones (not shown) may be connected.

Alternatively, as shown in Fig. 3, the PMD may include a wristband so as to be worn like a wristwatch. The PMD may also be provided on an armband. A jack 202 is also provided to which headphones (not shown) may be connected to the PMD 103. Alternatively, wireless headphones may be used.

The music available at the kiosks of the present invention may be provided to the kiosks in a number of ways under the principles of the present invention. For example, the kiosks may be visited and regularly serviced to provide new or additional musical recordings for patrons.

Alternatively, as shown in Fig. 1, the kiosks may have a connection 109 which is a dedicated cable network, a wireless local or long-distance telephone service or a connection to public phones lines with which the kiosk 101 can communicate with a central facility (not shown).

Over this connection 109, the central facility can periodically and electronically communicate with the kiosk 101 to update the music available. The music

5 available from the kiosk 101 is stored in a music
database 108.

10 While the present invention has been described as a
method and device for distributing musical works, the
15 present invention may also be used to distribute other
audio files. For example, the present invention may be
employed as described above to distribute or vend audio
news clips describing current events, audio books, or any
other audio recording. The only constraints on the size
20 of the audio files distributed are the size of the memory
in the personal music device and the time required to
download the audio file.

25 The preceding description has been presented only to
illustrate and describe the invention. It is not
intended to be exhaustive or to limit the invention to
any precise form disclosed. Many modifications and
variations are possible in light of the above teaching.

30 The preferred embodiment was chosen and described in
order to best explain the principles of the invention and
its practical application. The preceding description is
intended to enable others skilled in the art to best
utilize the invention in various embodiments and with
various modifications as are suited to the particular use
contemplated. It is intended that the scope of the
35 invention be defined by the following claims.

5

WHAT IS CLAIMED IS:

10

1. A method of commercially distributing musical
5 recordings comprising downloading a digital recording of
music from a kiosk (101) to a self-contained personal
music device (103) which stores the recording in an
15 electronic memory (110) and can play the music recording.

15

10

2. A method as claimed in claim 1, wherein said
20 downloading comprises wirelessly downloading said digital
recording of music.

20

15

3. A method as claimed in claim 1, further
comprising:

25

reviewing a listing of music recordings which are
available for download on a display (105) of said kiosk
(101); and

30

20

selecting a music recording for download from said
listing, said selecting being performed with a user input
device (106) on said kiosk (101);

35

25

wherein said downloading is initiated in response to
said selecting.

35

25

4. A method as claimed in claim 1, further
comprising receiving payment (115) for said downloading
of said music recording.

40

30

5. A method as claimed in claim 1, further
comprising:

45

retrieving said music recording from said electronic
memory (110); and

50

35

transducing said music recording into audible sound
with said personal music device (103).

50

55

5 6. A self-contained personal music device
comprising,

10 a receiver (102) for receiving a download of a
digital music recording;

5 an electronic memory unit (110) for storing said
digital music recording; and

15 a processor (111) for accessing said recording in
said memory unit (110) and outputting an audio signal
which can be transduced into audible sound.

10

20 7. A device as claimed in claim 6, wherein said
receiver (102) is a wireless receiver for receiving said
download of a digital music recording wirelessly.

15

25 8. A device as claimed in claim 6, further
comprising a port (112) for receiving a jack of a pair of
headphones, said audio signal being output through said
port (112).

25

20

30 9. A device as claimed in claim 6, wherein said
personal music device (103) further comprises a wristband
(301), said personal music device (103) being sized to be
worn on a human wrist.

30

35

25 10. A device as claimed in claim 6, wherein said
personal music device (103) further comprises a clip
(201) for clipping said device to a user's clothing.

35

40

30 11. A device as claimed in claim 6, further
comprising a user input device (113) with which a user
can control said processor (111) to selectively access or
process music recordings in said memory unit (110).

40

45

35 12. A device as claimed in claim 6, further
comprising a display device (114).

45

50

55

5 13. At least one kiosk (101) for dispensing digital music recordings to personal music devices (103), said at least one kiosk (101) comprising:

10 a music database (108) containing at least one
5 digital music recording; and
a transmitter (104) for transmitting a digital music recording from said database (108).

15 14. A kiosk as claimed in claim 13, wherein said
10 transmitter (104) is a wireless transmitter for wirelessly transmitting said music recording to said
20 personal music device (103).

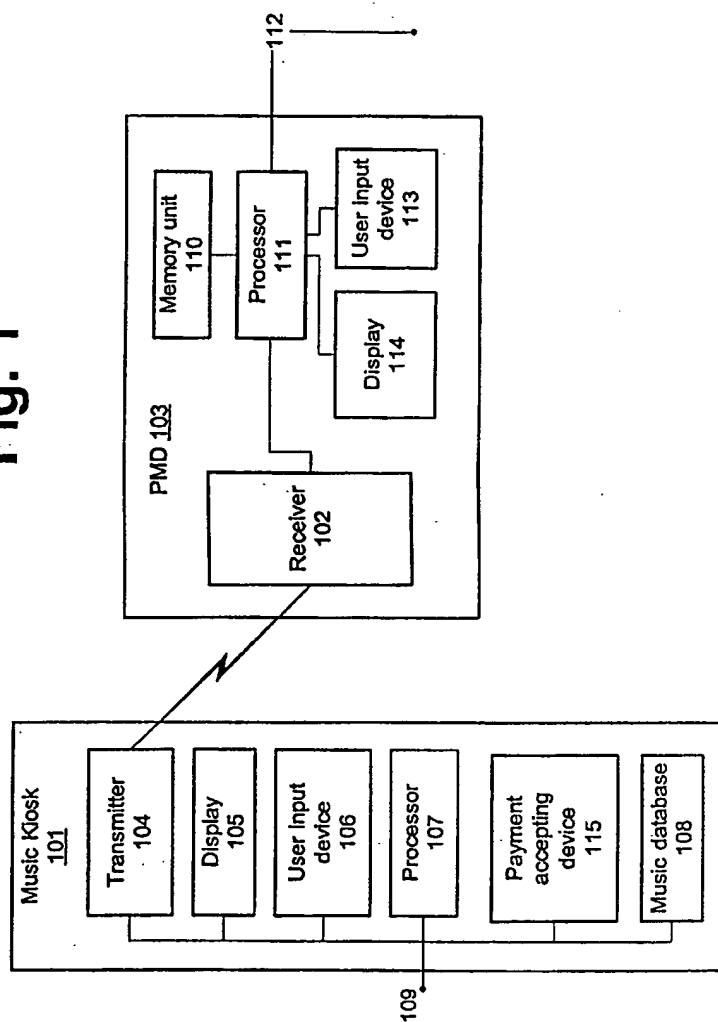
25 15. A kiosk as claimed in claim 13, further comprising a payment receiving device (115) for receiving payment for transmitting said digital music recording.

30 16. A kiosk as claimed in claim 13, further comprising a display device (105) driven by a processor (107), wherein said processor (107) displays a listing of the music recordings in said database (108) on said display device (105).

35 17. A kiosk as claimed in claim 16, further comprising a user input device (106) connected to said processor (107), wherein said user input device (106) can be used to control said displayed listing of music recordings and to select a music recording from said
40 listing to be transmitted by said transmitter (104).

30 18. A kiosk as claimed in claim 13, further comprising an external connection (109) through which
45 music recordings can be remotely added to or deleted from said database (108).

35 19. A kiosk as claimed in claim 13, wherein said at least one kiosk (101) comprises a plurality of kiosks.

Fig. 1

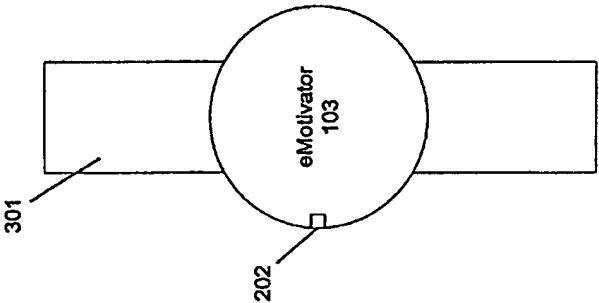


Fig. 3

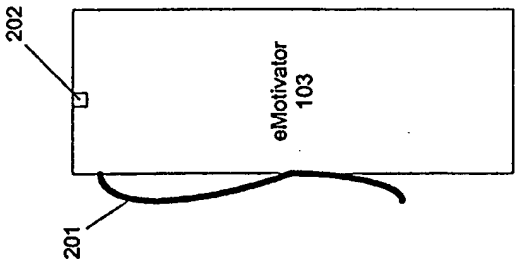


Fig. 2

International Application No.
PCT/US 99/20789

3

INTERNATIONAL SEARCH REPORT

Inter- national Application No
PCT/US 99/20789

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 96 08006 A (VOICE IT TECH INC) 14 March 1996 (1996-03-14)	10
A	page 8, line 16 -page 11, line 10 page 12, line 12 -page 13, line 16 page 36, line 10 -page 37, line 2 page 42, line 11 -page 43, line 2 page 45, line 28 -page 47, line 6 figures 1,2,19,22,28 ----	9,11,12
Y	EP 0 649 121 A (IBM) 19 April 1995 (1995-04-19)	13-19
A	page 4, line 13 -page 6, line 43 page 12, line 36 -page 13, line 30 page 41, line 8 -page 43, line 30 figures 1,11,12,16,24,27 ----	1-5
A	US 5 781 889 A (TILLERY MICHAEL L ET AL) 14 July 1998 (1998-07-14) column 2, line 66 -column 6, line 38 figure 1 ----	1-7,11, 12
A	US 5 787 399 A (CHO CHAN-DONG ET AL) 28 July 1998 (1998-07-28) ----	
A	US 5 742 893 A (FRANK ARMIN) 21 April 1998 (1998-04-21) ----	
A	US 5 547 202 A (TSUMURA MIHOJI) 20 August 1996 (1996-08-20) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/20789

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0817139 A	07-01-1998	US 5894119 A JP 10232690 A	13-04-1999 02-09-1998
FR 2560059 A	30-08-1985	IT 209125 Z	12-09-1988
WO 9608006 A	14-03-1996	AU 3586495 A	27-03-1996
EP 0649121 A	19-04-1995	JP 7175868 A JP 10207965 A KR 143358 B US 5734719 A	14-07-1995 07-08-1998 17-08-1998 31-03-1998
US 5781889 A	14-07-1998	US 5355302 A US 5848398 A US 5930765 A CA 2131375 A EP 0630501 A JP 7504517 T WO 9318465 A AU 8073291 A WO 9120082 A	11-10-1994 08-12-1998 27-07-1999 16-09-1993 28-12-1994 18-05-1995 16-09-1993 07-01-1992 26-12-1994
US 5787399 A	28-07-1998	KR 138333 B CN 1118101 A JP 7325600 A	15-05-1998 06-03-1996 12-12-1995
US 5742893 A	21-04-1998	DE 4337726 A WO 9512929 A EP 0727114 A	11-05-1995 11-05-1995 21-08-1996
US 5547202 A	20-08-1996	JP 5228259 A JP 5237265 A JP 5324509 A JP 6044269 A JP 6044159 A JP 6044160 A AU 672770 B AU 3312193 A CA 2089774 A CN 1076537 A EP 0556840 A EP 0962900 A	07-09-1993 17-09-1993 07-12-1993 18-02-1994 18-02-1994 18-02-1994 17-10-1996 19-08-1993 19-08-1993 22-09-1993 25-08-1993 08-12-1999